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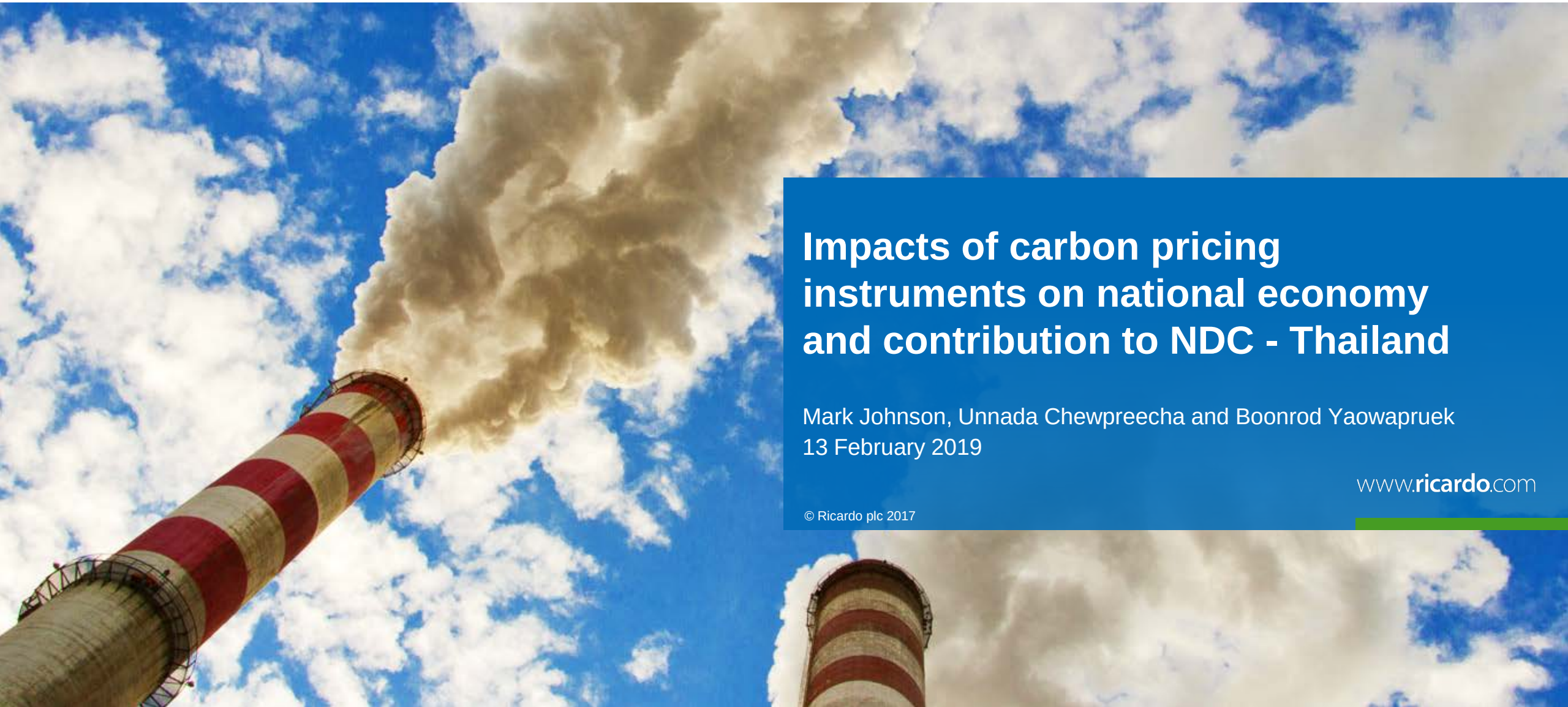

Impacts of carbon pricing instruments on national economy and contribution to NDC - Thailand

Mark Johnson, Unnada Chewpreecha and Boonrod Yaowapruek

13 February 2019

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Agenda

- 9.30 – 9.45: Introduction to project *(TGO)*
- 9.45 – 10.00: Introduction to project objectives and carbon pricing instruments – overview and objectives *(Ricardo, Cambridge Econometrics and Creagy)*
- 10.00 – 10.20 Presentation on model assumptions and limitations *(Cambridge Econometrics)*
- 10.20 – 10.40 Introductory presentation on key principles for comparing tax, trading and NDC policies *(Ricardo)*
- **10.40 – 11.00 Break**
- 11.00– 11.30: Presentation on revenue recycling, punishment rates and administrative costs *(Ricardo and Creagy)*
- 11.30 – 12.00: Panel discussion on determining preferred policy options
- **12.00 – 13.00 Lunch**
- 13.00 – 13.30: Presentation on model results sectoral coverage *(Ricardo and Creagy)*
- 13.30 – 14:00 Panel discussion on sectoral coverage
- **14.00 – 14.20 Break**
- 14.20 – 15.00: Presentation on maximising benefits of carbon pricing through design choices *(Ricardo and Creagy)*
- 15.00 – 15.40 Presentation on model refinements concerning revenue recycling percentage, offsetting percentage and free allocation *(Cambridge Econometrics and Ricardo)*
- 15.40 – 16:40 Panel discussion on carbon pricing design choices and next steps
- 16.40 – 17.00 Closing remarks *(TGO, Cambridge Econometrics, Ricardo and Creagy)*

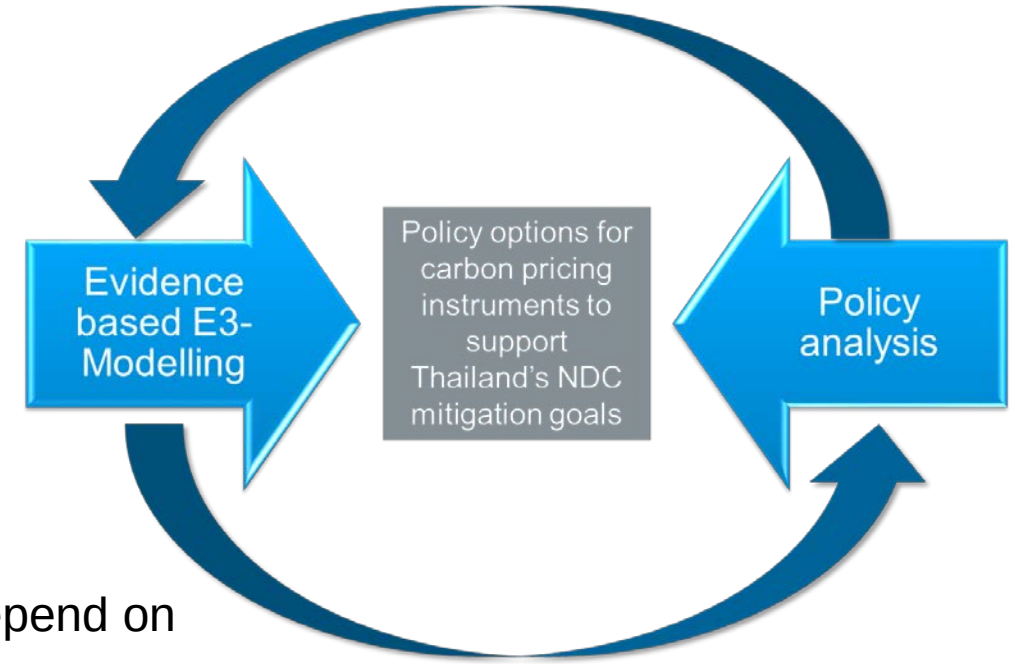
Project background

Within the PMR framework Thailand aims to implement a market based instrument to decrease energy consumption and reduce greenhouse gas emissions from several sectors including energy, industrial processes, transport and waste.

A key consideration for Thailand (as with many governments) is whether a carbon tax or Emissions Trading Scheme (ETS) is the most suitable carbon pricing policy to achieve the Thai NDC and aligning with Thai sustainable development plans.

Project objectives

- **Objectives:** Provide policy recommendations on suitable policy options for carbon pricing instruments to support Thailand NDC mitigation goals and evaluate policy and economic impacts on stakeholders



- **Methodology - three activities:**
  - Activity 1: Modelling exercise
  - Activity 2: Interaction analysis
  - Activity 3: Policy dialogues

- **Purpose of the day:**
  - Present modelling and analysis outcomes and how these depend on assumptions made
  - Support broad evidence-based policy discussion on carbon pricing instruments and capacity building on the role of CPIs in Thailand
  - Present policy recommendations on options for carbon pricing instruments to achieve Thailand's NDC targets

Team Overview

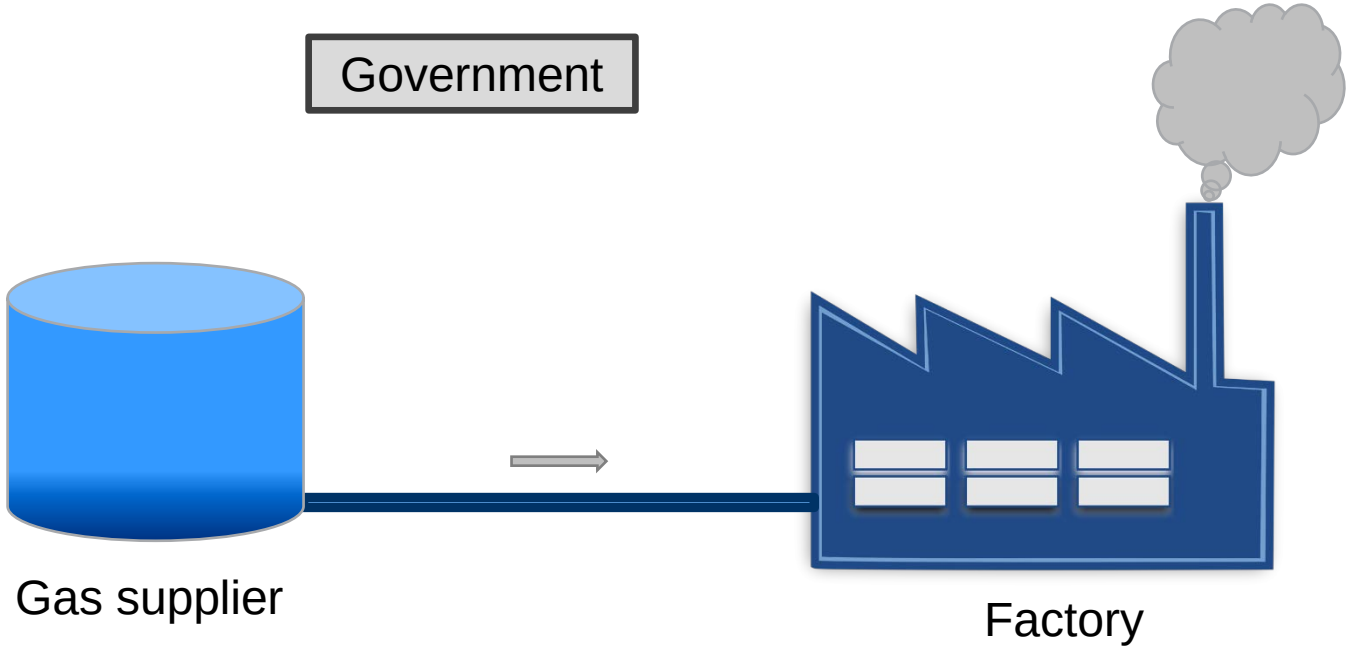
Cambridge Econometrics (team leader)
- develop E3-Thailand
- CPI scenario analysis to provide macroeconomic impacts
- provide model training courses

Ricardo Energy & Environment
- analysis of climate and energy policy design in Thailand
- develop policy recommendations for Thailand
- lead on capacity building

Creagy
- complementary insights to the local policy, plan and programme analysis
- organising capacity building events and providing local contacts

- Unnada will prepare slides for this session

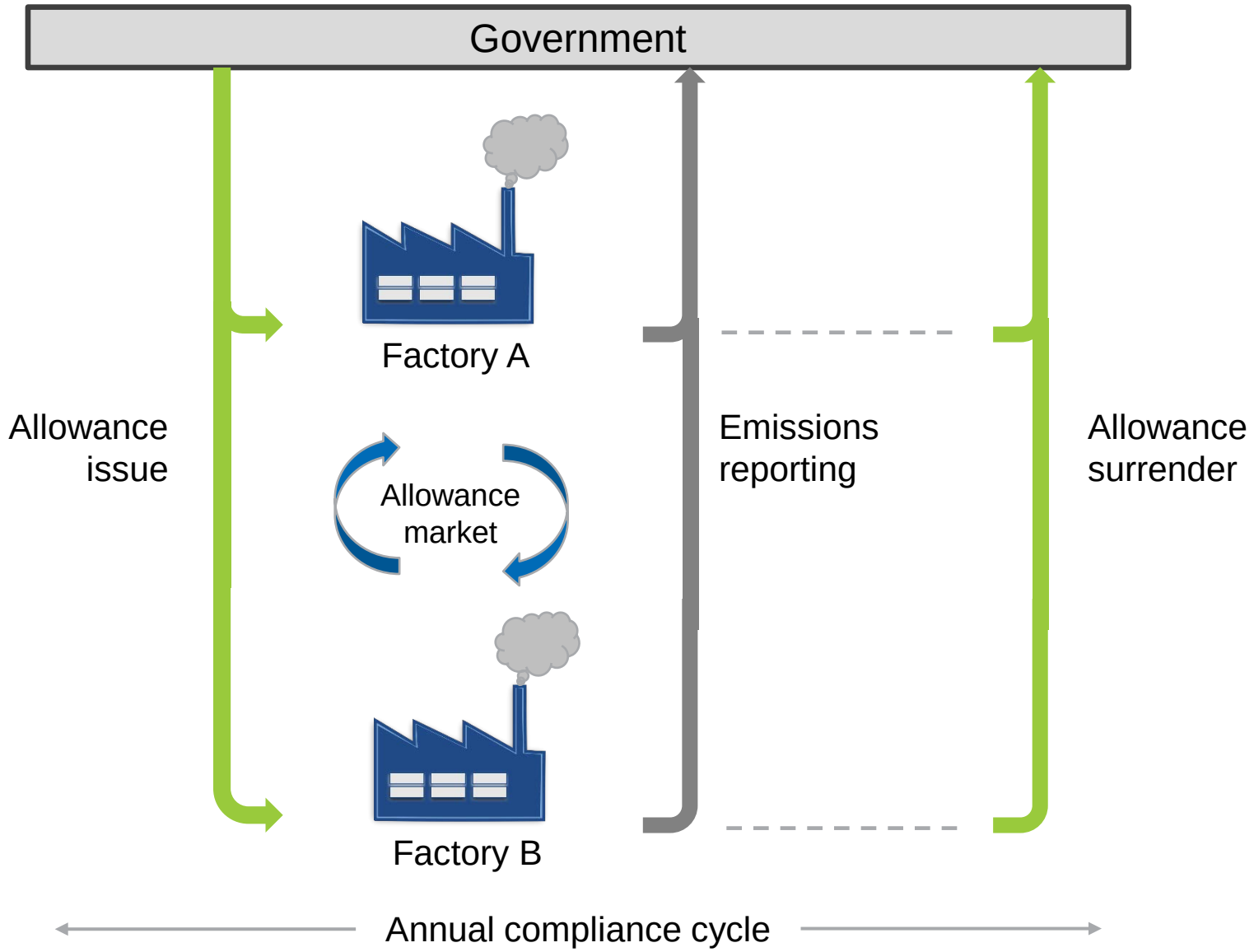
Carbon taxes: How can they function?



Carbon tax options:

1. Factory accounts for annual gas supplies and pays tax rate to Government
2. Gas supplier levies carbon tax on each bill to factory, and pays these revenue to Government
3. Government charges tax to gas supplier for amount of gas supplied to factory

Overview of emissions trading



Some important carbon tax & emissions trading comparisons

Key issue	Carbon tax	ETS
Targets	• Carbon price based on intended abatement	• Emission cap
Markets		• Complex market structures
MRV	• Simple if upstream • Complex if based on carbon footprint	• Generally complex
Flexibility	• Potentially offsetting	• Project credits / offsets. • Banking and borrowing
Cost impacts	• Thresholds • Rebates • Revenue recycle	• Free allocation • Cost compensation measures
Investment signals	• Based on politically set tax rates	• Long term emissions targets

Overview of model runs

- **Question 1: Assessing cost-effectiveness of NDC and carbon pricing concepts**
  - Core cases with medium coverage

- **Question 2: Optimal carbon pricing sectoral coverage**
  - Varying scope
  - ETS small, medium and large
  - CT medium, large, and very large
  - Hybrid: ETS medium and CT large

Sector groupings:
Small: energy-intensive industry
Medium: industry
Large: industry, commercial and tansport
Very large: industry, commercial, transport and residential

- **Question 3: Key carbon pricing design options**
  - Offsetting
  - Varying global energy price
  - Higher ambition (conditional targets)
  - Different revenue recycling mechanisms

Assessing cost-effectiveness of the carbon price scenarios – example of carbon tax

Assumption

Determine flat tax rate to achieve NDC target in 2030

↓

Tax rate high compared to ETS

↓

Revenues used to offset income tax

Cost to businesses ↑

Carbon costs paid by business

↑	**High tax rate** raises high amount of revenue paid by business

Cost to economy ↑

GDP

↑	Higher **economic activity** because of lower income tax
↑	Higher energy costs, leading to reduced energy use and lower fuel **imports**
↓	Higher energy costs also lowers **demand for goods and services**

Cost to society ↑

Employment

↑	**Overall** similar positive impact as GDP through lower income tax
↓	**Sectoral** difference from GDP through energy intensive sectors such as utilities and mining

Negative cost impact

Neutral cost impact

Positive cost impact

Carbon tax design elements and their impacts

- **Tax rate**
  - Does not provide certainty of achieving NDC target
  - Determines costs faced by businesses, either with flat tax rate or phased in over time
  - Tax rate is set as political decision which may raise opposition
- **Sectoral coverage**
  - Grouping sectors under one scheme means all sectors will face the same carbon price
- **Revenue recycling rate**
  - A tax is inherently a revenue raising instrument. Revenues can be recycled for GDP, employment and emission impacts
  - There may be practical and legal difficulties with earmarking revenue for recycling
- **Tax-free thresholds**
  - Tax-free thresholds can reduce costs to businesses

ETS design elements and their impacts

- **Cap level**
  - Determines and guarantees emission reductions
  - Determines costs faced by businesses, carbon price develops over time
- **Sectoral coverage**
  - Grouping sectors under one scheme means all sectors will face the same carbon price
- **Auctioning (with revenue recycling) vs free allocation**
  - Free allocation can reduce costs to businesses
  - Auctioning allowances can raise revenue that can be recycled for GDP, employment and emission impacts
  - There may be practical and legal difficulties with earmarking revenue for recycling through auctioning
- **Offsetting**
  - Offsetting can allow GHG reductions to come from uncovered sectors
  - Offsetting can reduce carbon costs faced by businesses

Iterative approach to modelling

- Questions addressed in two stages:

- **Stage 1: Initial 16 model runs:**
  - Sensitivity model runs
  - Step-wise approach to determine impact of various design elements on Thai economy
  - Various options were discounted and a set of principles for detailed policy design was established, for:

- **Stage 2: Refined set of a further 29 model runs**
  - Specific recommendations on the role of carbon pricing instruments to achieve the Thai NDC and socio-economic targets

Question 1: Assessing the most-cost effective mitigation instrument

*Is **emissions trading** or **carbon taxing** a **more cost-effective** mitigation instrument compared to current policies and measures in the identified sectors that contribute to the achievement of Thailand's NDC mitigation goal?*

Scenarios	BAU	NDC	CT1	ETS1	ETS2
Definition	No climate policies or measures	Renewables and energy efficiency policies from higher income tax	Core carbon tax scenario	Core ETS scenario	ETS scenario with auctioning
Coverage	N/A	All sectors	Industry	Industry	Industry
Target setting	N/A	NDC unconditional target	Flat rate to achieve 2030 target	Cap is set year-on-year	Cap is set year-on-year
Revenue recycling?	N/A	N/A	Yes, used to offset income tax	100% free allocation	100% auctioning Used to offset income tax

Model baseline

- **BAU** scenario follows projections in the NDC roadmap

- **NDC** scenario
  - Modelling of energy efficiency policies (83 $mTCO_2$ savings)
    - Costs based on estimates from IEA
    - 70% paid by government, increase in income tax
    - 30% paid by businesses (added to their costs)
  - Modelling of renewable energy policies (30 $mTCO_2$ savings)
    - Represented in electricity prices
    - Power sector fuel consumption and emissions
    - Electricity investments
    - *This affects indirect emissions in the next scenarios*

Key conclusions from initial results – Question 1

- **NDC Policies vs carbon pricing:**
  - **Assumption:** The NDC policies are assumed to involve a mix of public and private investment
  - **Results:** Above investment and revenue recycling results in some GDP and employment benefits compared to ETS where slightly less opportunity for revenue recycling exists

	Cost to business	Cost to economy (incl. revenue benefits)	Cost to society	Certainty of environmental outcome
	Average carbon price paid from 2020 - 2030	GDP difference from BAU in 2030 in 2002 billion Baht	Employment % difference from BAU in 2030	
NDC	0.0	458	0.3	
Core CT (CT1)	923	586	0.2	
Core ETS (ETS1)	0.0	408	-0.3	
ETS with 100% auctioning (ETS2)	576	584	0.1	

Recommendation: There is a role for NDC policies in preference to carbon pricing, with the following caveats:

- In this project the NDC policies were modelled in a simplified way
- The GHG results that can be achieved from the NDC policies are uncertain
- The results above only concern carbon pricing applied to industry.

Overall, the use of carbon pricing for industry, especially the ETS free allocation case, is broadly similar to NDC policies for the sector, but preferable because it provides greater confidence in the achievement of emission targets.

Key conclusions from initial results – Question 1

- **Revenue recycling policies:**
  - Assumption: Revenue is recycled to stimulate economic growth
  - Results: Revenue recycling can deliver significant wider economic (GDP) benefits, however, there are major difficulties with these approaches:
    - No possibility for revenue earmarking in Thailand
    - Reducing other taxes at the same time is practically difficult
    - Costs to businesses are very high

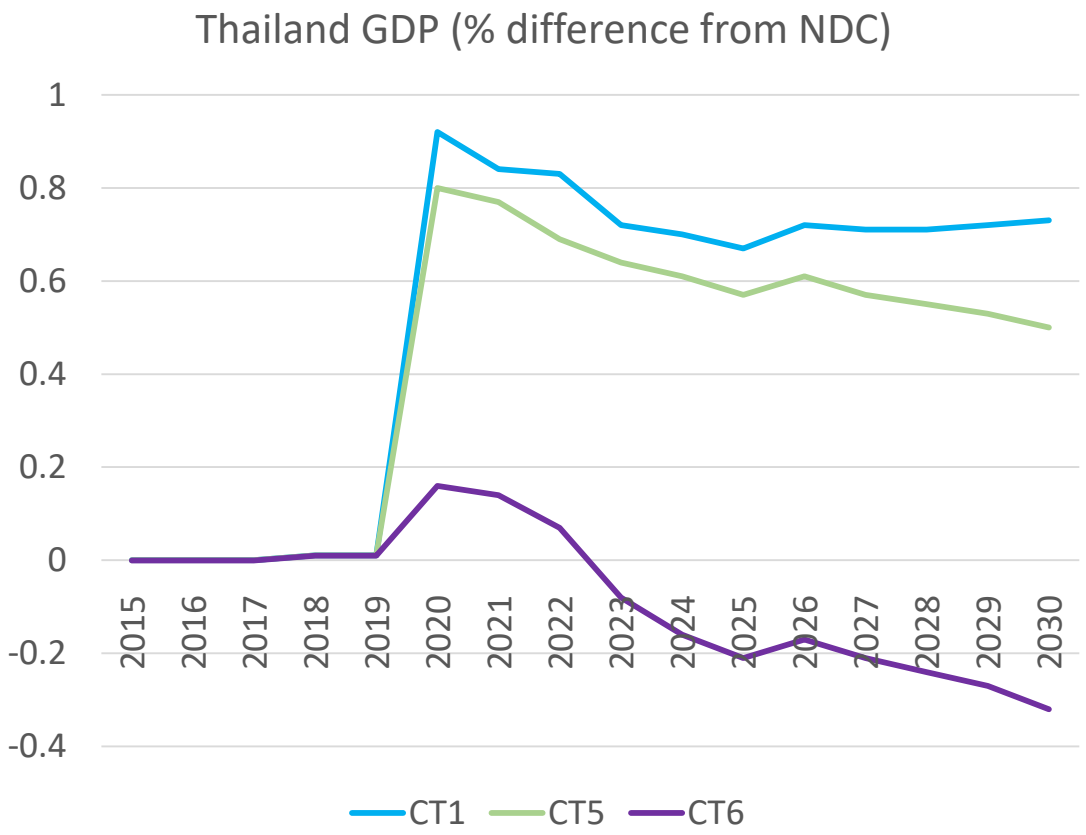
Recommendation: Options with no or more limited revenue recycle are needed and measures that mitigate the costs for carbon price payers are necessary

- This would mean high free allocation and use of offsetting for an ETS.
- For a carbon tax it would involve high tax-free thresholds.
- Experience with other countries suggests that in general as carbon pricing becomes more established, the level of cost compensation can be reduced.
- However, for particular cases of trade exposed industries, it is desirable to maintain these carbon leakage protection measures whilst comparable carbon pricing is not in place in competing jurisdictions.

Various carbon tax revenue recycling scenarios

Recycling revenue via an emission reduction programme can lower the carbon price compared to the core case as:
- The emission reduction programme reduces emissions that don't need to be incentivised by the carbon tax anymore
- There is less economic growth as a consequence of revenue recycling

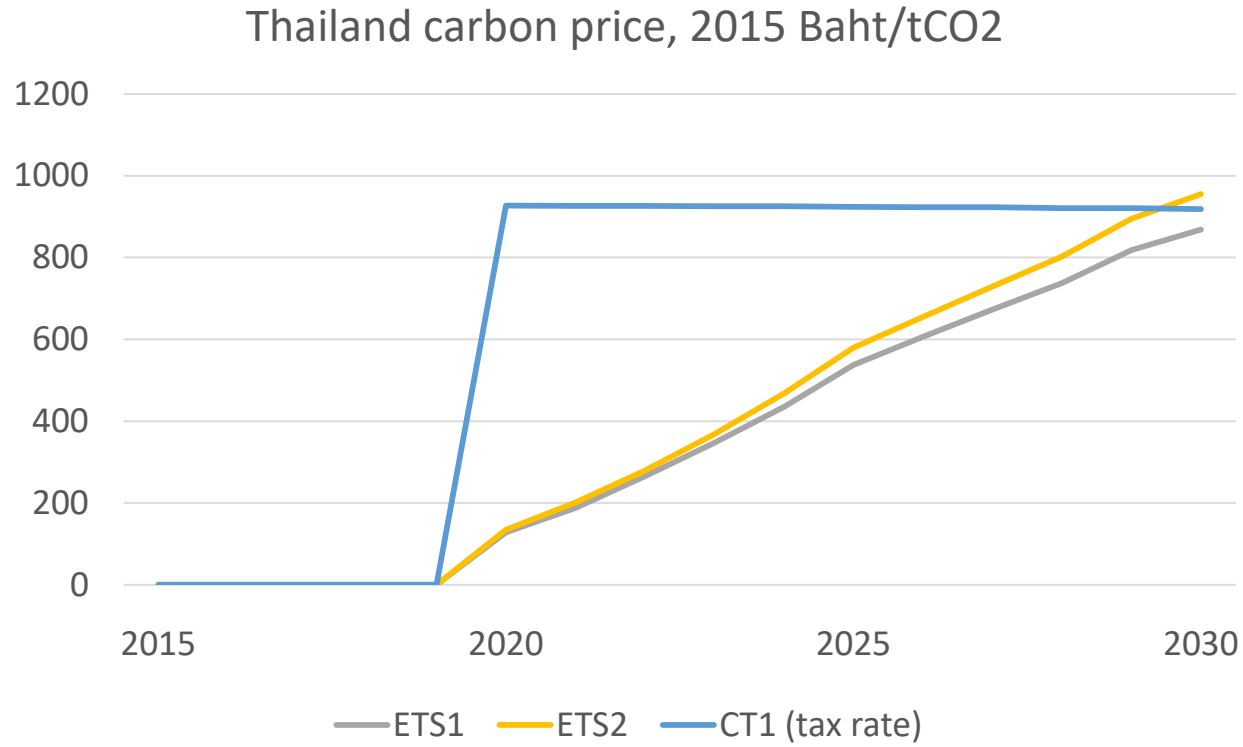
Scenarios	CT1	CT5	CT6
Definition	CT where revenue offsets income tax	CT with emission reduction programme	CT with revenues retained by treasury
Coverage	Medium (industry)	Medium (industry)	Medium (industry)
Target setting	Flat tax rate to reach unconditional target in 2030	Flat tax rate to reach unconditional target in 2030	Flat tax rate to reach unconditional target in 2030
Revenue recycling?	**Yes, used to offset income tax**	**Yes, used for emission reduction programme**	**Revenues retained by treasury**



Key conclusions from initial results – Question 1

- **Carbon price profile:**
  - Assumption: ETS shows how a carbon price steadily increases over time, while the carbon tax case shows a flat rate at the level required to achieve the NDC target
  - Results: Under a flat rate carbon tax the price needs to be high to achieve the NDC target, which has a low political acceptance

Recommendation:
Policy options should involve a gradual introduction of the carbon price, as would happen under an ETS with increasing emission ambition or a carbon tax with a ramped-up tax rate.



ETS1: 100% free allocation
ETS2: 100% auctioning and revenue recycle

Administration costs – real examples converted to apply to the Thai context

- More insights into administrative costs not in model but from real examples converted to apply to the Thai context

	EU ETS	CRC *(end-user CT)*	CCL *(upstream applied)*
Costs to participants in Thai Baht	603,515.75 *(per installation)*	192059.77 *(per participant)*	-
Cost to implementer in Thai Baht	84,502.46 *(per installation)*	-	-
Weighted (by emission level) average cost per tCO_2e in euro or GBP	0.26 EUR	0.17 GBP	0.06 GBP
Weighted (by emission level) average cost per tCO_2e in Thai baht	9.76	7.22	2.39
Costs applied to 2030 Thai NDC target as % of total cost paid by business	**1.06%**	**0.79%**	**0.26%**

Recommendations based on findings administrative costs

- Upstream approaches of carbon pricing instruments are more cost-effective in terms of admin costs

- Downstream approaches have potential to attract more management attention to the importance of emission reductions (non-quantified benefit)

- Therefore, in Thailand:
  - **ETS should be applied at facility level**
    - Need sufficient number of participants to enable liquid market
  - **Carbon tax should be applied at upstream level in combination with transparency mechanisms**
    - Minimises administrative costs as seen for CCL
    - Transparency mechanisms such as visualisation on energy bills can highlight carbon costs businesses are paying

Penalty rates

	EU ETS	New Zealand ETS	Regional Greenhouse Gas Initiative
Carbon price	21.38 EUR / tCO2e	24.90 NZD	5.35 USD / tCO2e
Penalty rate	EUR 100/tCO2	30 NZD (EUR 18.38) for each unit + interest	3x the amount of excess emissions have to be surrendered in allowances in future periods.
Basis for penalty rate	Flat rate increased with inflation	Flat rate with interest over time	Based on carbon price
Maximum penalty	No maximum	NZD 24,000 (EUR 14,702)	No maximum
Other elements to enforcement	general 'name-and-shame' sanction In the UK a civil penalty can be given	Additional penalty rates for misreporting information exist as well as the possibility for imprisonment of up to five years.	-
'Make-good provisions'	firms face an obligation to surrender the allowances owed in the next compliance period	Surrender or repay the outstanding units	compliance allowances for three times the excess emissions have to be surrendered in future periods
Responsible entity	Member State	Environmental Protection Authority	State Authority

- **High penalty rate** creates incentive for compliance
- **Make-good provision** preserves environmental integrity and avoids penalty being seen as buy-out
- A **'name-and-shame'** regulation can provide a low-cost effective enforcement mechanism

Panel session

Questions:

- Do you have any questions about the model runs and analysis presented?
- Are there other benefits to the policies presented here that have not been highlighted?
- Do you have a preferred policy option from the list presented here?
- What is your feedback on the recommendations presented here?
- Which issues should be the focus of further study?

- **Key findings and main recommendations:**
  - The use of carbon pricing for industry, especially the ETS free allocation case, is broadly similar to NDC policies, but preferable because it provides greater confidence in the achievement of emission targets.
  - Options with no or more limited revenue recycle are needed and measures that mitigate the costs for carbon price payers are necessary
  - Policy options should involve a gradual introduction of the carbon price: either an ETS with increasing emission ambition or a carbon tax with a ramped-up tax rate.
  - Based on studies of administrative costs:
    - ETS should be applied at facility level
    - Carbon tax should be applied at upstream level in combination with transparency mechanisms
  - A high penalty rate creates incentive for compliance, make-good provisions preserve environmental integrity and avoids penalty being seen

Impacts of carbon pricing instrument on Thai NDC and socio-economic targets – Agenda - 13 February			
Revenue recycling, admin costs and penalty rates	Sectoral coverage	Maximising benefits: offsetting and interacting policies	Additional model runs: Phasing carbon tax and ETS free allocation

Question 2 and scenarios

*If ETS and carbon tax has a key role to play, what is **the most appropriate instrument** or its combination for the achievement of Thailand's NDC mitigation goals (on both political and technical point of view)?*

Scenarios	ETS1	ETS3	ETS4	CT1	CT2	CT3	Hybrid1
Definition	Core ETS scenario	ETS small	ETS large	Core carbon tax scenario	Carbon tax large	Carbon tax very large	Hybrid
Coverage	**Medium** Industry	**Small** Energy-intensive industry	**Large** Industry, transport, commercial	**Medium** Industry	**Large** Industry, transport, commercial	**Very large** Industry, transport, commercial and residential	**ETS for medium** (industry) **CT for large** (transport and commercial)
Target setting	Cap is set year-on-year	Cap is set year-on-year	Cap is set year-on-year	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target
Revenue recycling?	100% free allocation	100% free allocation	100% free allocation	Yes, used to offset income tax	Yes, used to offset income tax	Yes, used to offset income tax	Yes, used to offset income tax

Sectoral coverage

Sector	Small scope	Medium scope	Large scope	Very large scope	Hybrid 1	Source of offsets
Power						✓
Core industry	✓	✓	✓	✓	**ETS**	
Core industrial subsectors include: Energy own use & transformation (including refineries), Iron & steel, Chemicals, Cement, Other non-metallics, Paper & pulp, Plastic						
Other industry		✓	✓	✓	**ETS**	
Other industry subsectors include: Non-ferrous metals, Ore-extra.(non-energy), Food, drink & tobacco , Textiles, clothing & footwear, Engineering, Construction and any other						
Transport			✓	✓	**CT**	✓
Commercial and public sector			✓	✓	**CT**	
Residential				✓		

Sectoral evaluation: exclusion of power generation

- Incentivising **fuel switching**
  - Dependent on: presence of economic dispatch system
  - Lack of economic dispatch system undermines possible effectiveness of CPI for fuel switching in Thailand

- Incentivising **long-term investments in renewables**
  - Dependent on: contracting and investment environment for new generation

  Lack of direct competition for investments between renewables and fossil-fuel based generation undermines effectiveness of CPI to impact investments in new capacity to reduce emissions

- Incentivising **rational use of electricity**
  - Dependent on cost-pass through to end-use consumers
  - A carbon price on the electricity sector could have significant impact

Question 2 and scenarios

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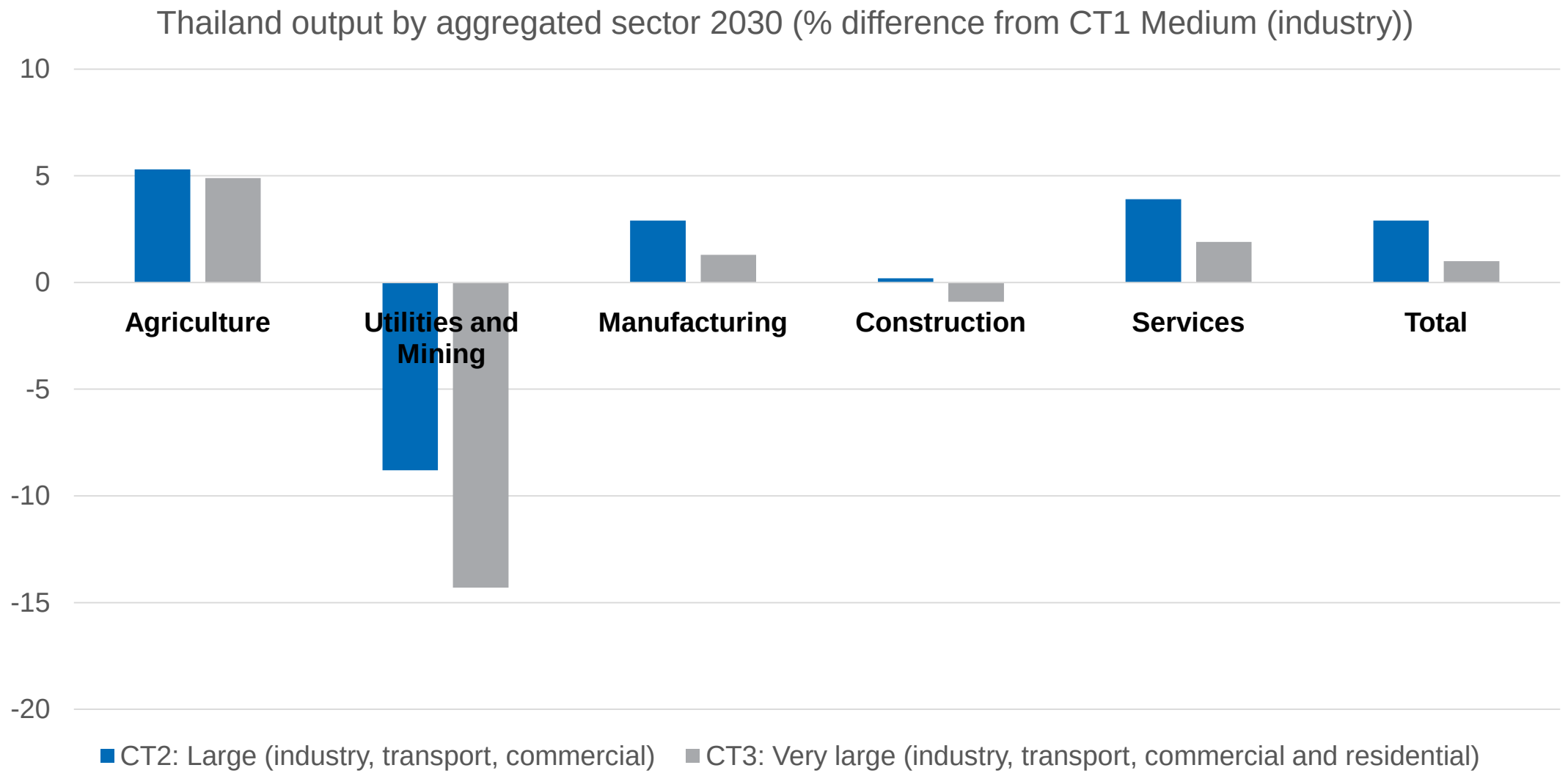
Target setting	Cap is set year-on-year	Cap is set year-on-year	Cap is set year-on-year	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target	Flat rate to achieve 2030 target
Revenue recycling?	100% free allocation	100% free allocation	100% free allocation	Yes, used to offset income tax	Yes, used to offset income tax	Yes, used to offset income tax	Yes, used to offset income tax

ETS scenarios - Coverage

Carbon tax scenarios - Coverage

Sectoral effects



- The services sector often benefits in high carbon price scenarios, due to higher consumer spending when revenues are used to lower the income tax in Thailand

Hybrid scenario

Panel session

Questions

- Do you have any questions about the model runs and analysis presented?
- Are there other benefits to the policies presented here that have not been highlighted?
- Do you have a preferred sectoral coverage policy option from the list presented here?
- Why was transport considered to have a large amount of low cost abatement opportunities during the NDC consideration?
- What is your feedback on the recommendations presented here?
- Which issues should be the focus of further study?

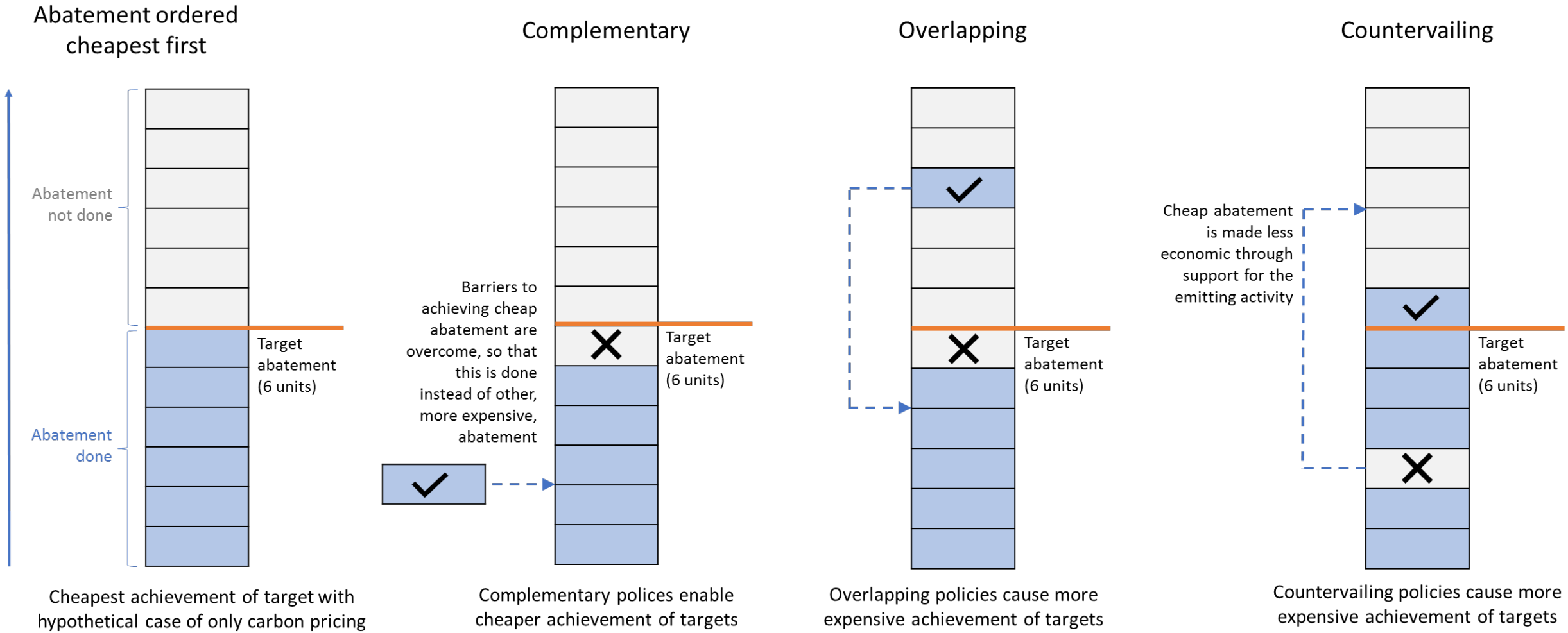
- **Key findings and main recommendations:**
  - The transport sector overall has higher abatement costs
  - Energy dependent sectors such as utilities and mining deliver most of the emission reductions when the carbon price is high
  - The services sector often benefits in high carbon price scenarios, due to higher consumer spending when revenues are used to lower the income tax in Thailand
  - The residential sector in comparison with the transport sector has lower abatement costs
  - A hybrid scenario separates the ambition levels from different sectors. The price for the transport sector is therefore even higher under a hybrid scenario compared to a similar coverage in a carbon tax or ETS only.

Impacts of carbon pricing instrument on Thai NDC and socio-economic targets – Agenda - 13 February			
Revenue recycling, admin costs and penalty rates	**Sectoral coverage**	Maximising benefits: offsetting and interacting policies	Additional model runs: Phasing carbon tax and ETS free allocation

Maximising benefits from carbon pricing instruments

- Introducing several methods to maximise benefits and minimise negative impacts:
  - Reducing **costs to businesses**
  - Improve **practical feasibility** and **enhance positive impacts** through revenue recycling
  - Enhance **complementary** policies that can make a carbon price more effective and vice versa
  - Minimise negative impacts from **overlapping** or **contradictory** policies

Various types of policy interactions



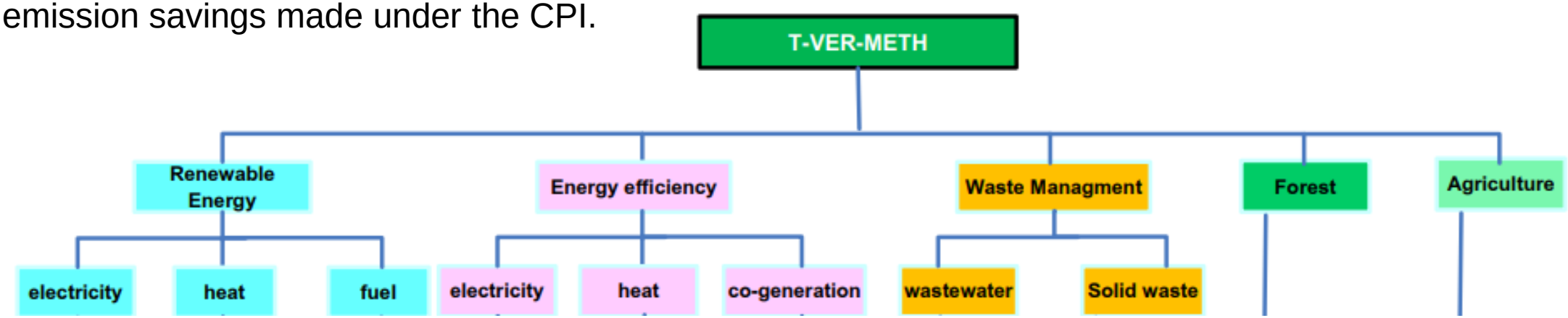
10 policy groups were studied

Group	Type of policy measure	Type of interaction
3.1	Knowledge, information and enabling measures for reduced energy use	Complementary
3.2	Research and development measures for carbon abatement	
3.3	Carbon abatement financing support	
3.4	Encouraging modal shift	
3.5	Credit schemes for carbon emission reductions	
3.6	Mandatory energy performance standards or emission standards	Overlapping
3.7	Fees or charges for high energy consumption	
3.8	Financial support for low energy consumption	
3.9	Financial support for usage of higher carbon content fuels	Countervailing
3.10	Financial support for higher energy consumption	

Policy group		Relevant policy measures and instruments
Knowledge, information and enabling measures for reduced energy use	Complementary	Labelling for products, buildings and vehicles EEP Public awareness campaigns and Capacity building,institutional development Solar PV net metering programme
R&D measures for carbon abatement		Smart Grid Development Master Plan (R&D policies) EE technology R&D under EEDP 2015
Carbon abatement financing support		Tax incentives for EE and RE Direct subsidy (80/20 program) Energy Efficiency Revolving Fund Energy Service Company (ESCO) Promotion Energy Points Programme
Encouraging modal shift		Finance for infrastructure development (Master Plan for Sustainable Transport)
Credit schemes for carbon emission reductions		**Thailand Voluntary Emission Reduction (T-VER) Programme** Low Carbon City Programme and Fund
Mandatory energy performance/emission standards	Overlapping	Energy efficiency measures for buildings, including: Minimum energy performance standards (MEPS) and Building Energy Code (BEC) **Energy Efficiency Resource Standards (EERS)** Biofuel mandates
Fees or charges for high energy consumption		Vehicle excise taxes based on energy efficiency of vehicle Residential electricity tariff block structure EERS Penalty Clause
Financial support for low energy consumption		Demand side management bidding programme EERS Reward Clause
Financial support for usage of higher carbon content fuels	Countervailing	**Oil Stabilization Fund**
Financial support for higher energy consumption		Thailand 4.0 Strategy on Industrial Policy Subsidies for low-income households' energy consumption

T-VER programme as offsetting in an ETS

- T-VER provides **carbon credits** for specifically selected emission reduction activities in Thailand
- Provides emission reductions but also **co-benefits**
- Additionality of offsets can only be guaranteed if it does not overlap with the scope of ETS.
  - In that case the policy is considered **complementary**
- When T-VER is linked to an ETS, cheaper abatement options from additional sectors can be undertaken, which lowers the carbon price and:
  - investors and operators of crediting projects receive **additional source of revenue** from the sale of credits.
  - crediting projects often involve significant investment, so they support **jobs and economic growth**. They can leverage additional third-party investment and enable **technology transfer**, often to rural areas.
  - In the case of a carbon tax, offsetting provides a **cheaper compliance option** whilst also extending the emission savings made under the CPI.

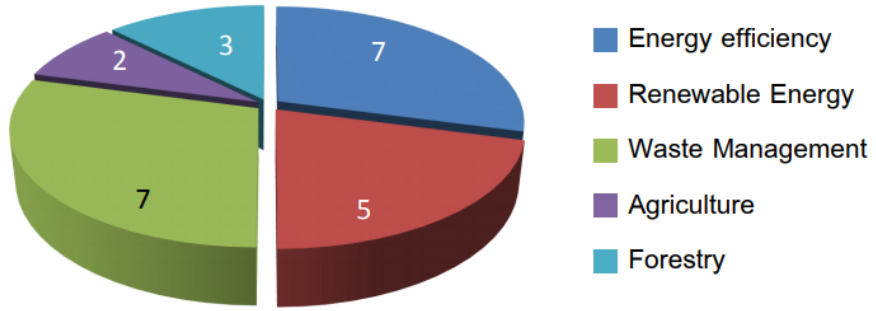


Recommendations – T-VER Programme

- The benefits are dependent on ensuring that the CPI works in a synergistic way with the T-VER programme
  - Crucial to ensure that double counting of emission reductions is avoided:
    - By excluding offsetting in sectors covered by the CPI; and
    - **By strengthening of the existing additionality requirements (and co-benefits) under T-VER.**
      - Currently only projects with emission savings over 60,000 tCO_2e/year need to prove their additionality.
  - The downside of taking these measures is:
    - risks excluding emission reductions that would be easy to implement.
    - adds extra administrative costs, thereby making the offsets and thus abatement more expensive overall.

- Demand is expected to increase substantially were the T-VER to be linked to a carbon pricing regime.

Recommendation to start awareness campaigns and capacity building programmes that can prepare the stakeholders around the T-VER programme and ensure delivery of the number of project credits that might be desired from CPI operators.

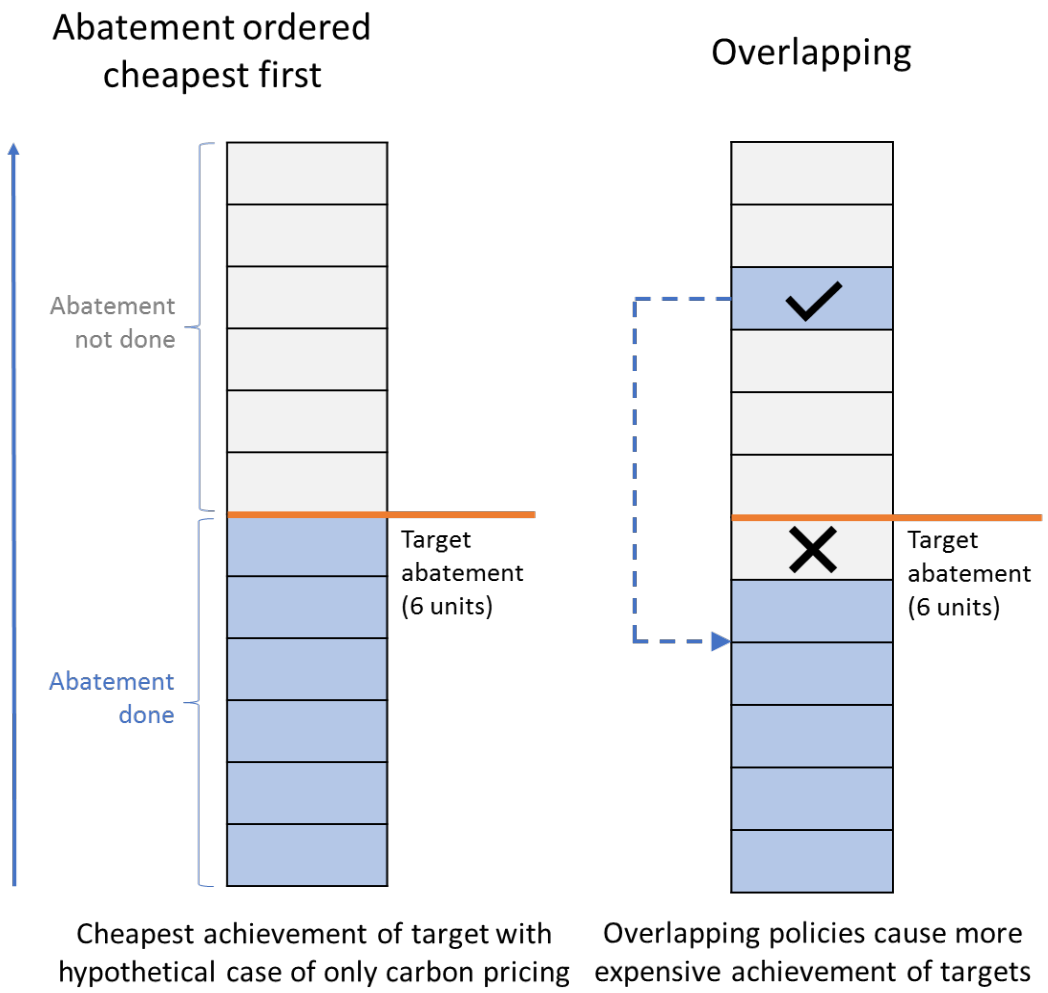


Status	no. of projects	emission reduction
registered	19	703,670 tCO2e/y
issued	7	343,645 tCO2e

2015 data

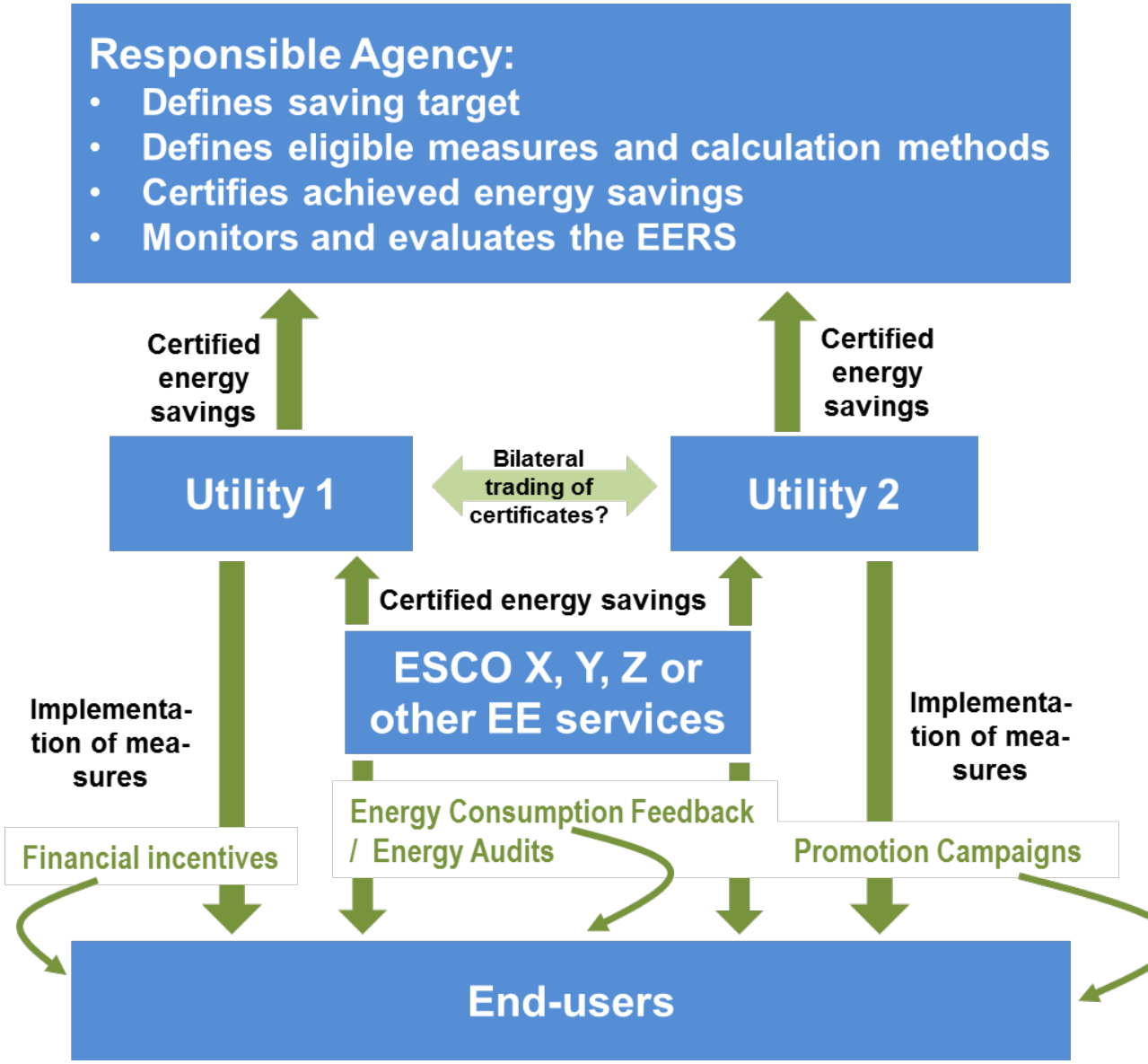
Minimise overlap of policies such as EERS

- **Energy Efficiency Resource Standards (EERS)** are requirements for large energy corporations to help consumers achieve a certain minimum level of energy savings
- Designed to support both the ENCON Act and the EEP
- Target is based on:
  - Historical energy sales from the utility of the past 3 years
  - Their possibilities and capabilities to save energy.
- **Overlapping interaction**



Recommendations to avoid overlap with EERS

- **Utilities are very well-suited for implementing the EERS programme and thereby lower the burden on the public budget, in a way that a CPI would not so easily do:**
  - Utilities have existing customer relations, extensive data sets on energy consumption behaviour and expertise in energy efficiency.
  - The EERS is also beneficial for utilities, as lower peak loads may reduce their need to upgrade to distribution networks and it allows them to improve reputation and to open new markets for energy services.
  - EERS has additional objectives beyond carbon such as:
    - local economic development
    - technological development
    - other environmental targets such as reducing emissions of refrigerant gases.



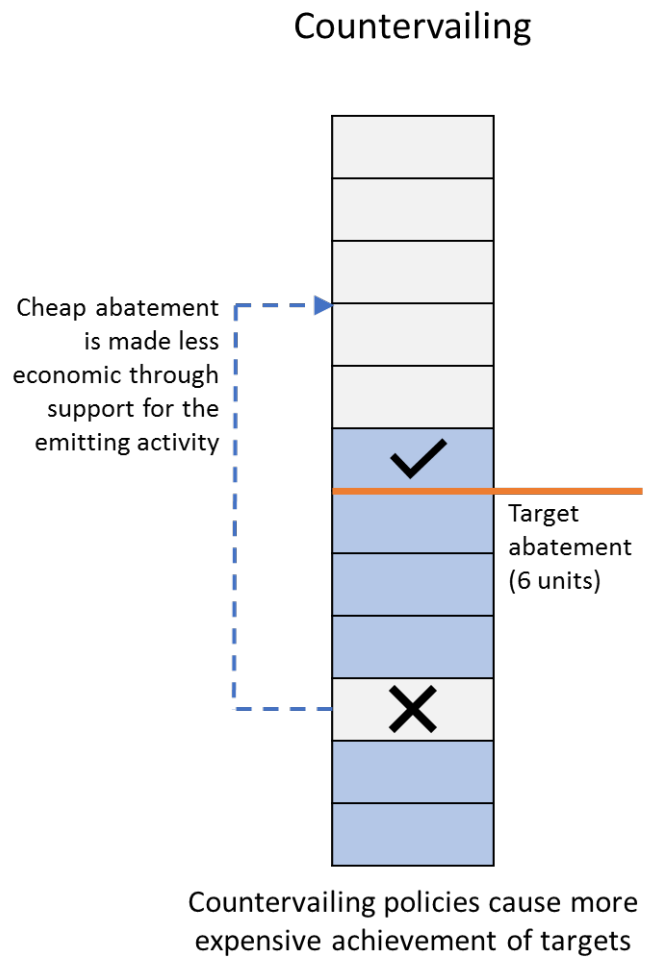
Recommendations to reduce overlap with EERS

- **Recommendations for policy and CPI adjustments**
  - Exemptions under a carbon tax could be applied for entities that are already targeted by the EERS
  - ETS: cap should be set to achieve additional emissions reductions, beyond those expected from EERS
  - Ensure that an independent governance framework is created whereby targets of the EERS are set in a predictable and ambitious way for a long timeframe and additional to emission reductions from a CPI.
    - by using the predictions for the emission reductions expected under an ETS whereby the cap becomes more stringent as in an ETS and applying this trend to historical data of emissions of entities in scheme.

Interaction analysis

- **Countervailing** interaction:

Emission trading system *Theory*	ETS and specific fossil fuel subsidies
Emission abatement measures are implemented where this is the cheapest with no preference for technology or fuel.	Price signal of ETS is impacted by subsidies, as marginal abatement cost curve changes shape. Can shift the focus for emission reduction away from subsidised fuels.
Emission reductions in line with carbon price	Upward pressure of subsidies on use of fuel can increase carbon price and increase government revenues from CPI.



Recommendations for policy interaction

- **Countervailing** policies may cause inefficiencies:
  - Fossil fuel subsidies and price caps could be gradually replaced with other policy instruments designed to ensure fuel affordability.
    - Taking into consideration global experience with universal “blanket type”, fuel subsidies proved to be inefficient
    - Targeted subsidies or **discounts for low income households** could be considered as an alternative tool.
      - Can ensure effective economic protection for low income population groups

- In case fossil fuel subsidies and price caps are continued, a medium- or **long-term implementation plan** should be announced to provide certainty for the energy markets and facilitate CPI planning and implementation.

- Whenever any changes are planned to be introduced to the considered policies, this should whenever possible be **aligned with the introduction or future changes of a CPI.**

Recommendations - recap

Revenue recycling, administrative costs and penalty rates:

- The use of carbon pricing for industry, especially the ETS free allocation case, is broadly similar to NDC policies, but preferable because it provides greater confidence in the achievement of emission targets.
- Options with no or more limited revenue recycle are needed
- Measures that mitigate the costs for carbon price payers are necessary
- Policy options should involve a gradual introduction of the carbon price (ETS or phased carbon tax)
- Based on studies of administrative costs: ETS should be applied at facility level and carbon tax should be applied upstream
- A high penalty rate creates incentive for compliance, make-good provisions preserve environmental integrity

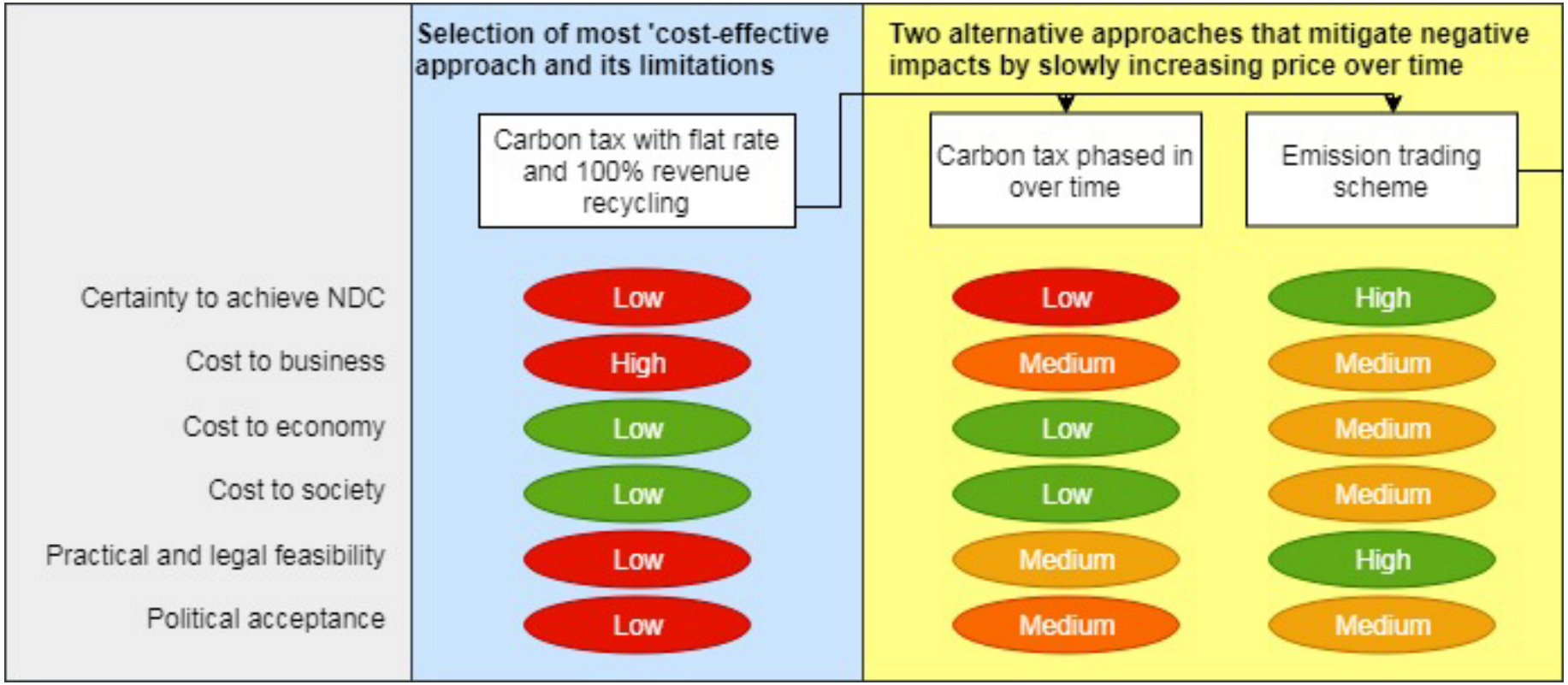
Sectoral coverage:

- The transport sector overall has higher abatement costs
- Energy dependent sectors such as utilities and mining deliver most of the emission reductions when the carbon price is high
- The services sector often benefits in high carbon price scenarios, due to higher consumer spending when revenues are used to lower the income tax in Thailand
- The residential sector in comparison with the transport sector has lower abatement costs
- A hybrid scenario separates the ambition levels from different sectors. The price for the transport sector is therefore even higher under a hybrid scenario compared to a similar coverage in a carbon tax or ETS only.

Maximising benefits:

- Offsetting can significantly reduce the costs to businesses and deliver additional co-benefits. Programmes should be designed so that the T-VER programme has the capacity to deliver high expected demand when integrated with an ETS
- An ETS or carbon tax should avoid overlap with the EERS (e.g. through changes to cap setting)
- Fossil fuel subsidies go directly against carbon pricing and should be gradually replaced by using timeline of policy reforms

Policy option refinement



Impacts of carbon pricing instrument on Thai NDC and socio-economic targets – Agenda - 13 February			
Revenue recycling, admin costs and penalty rates	Sectoral coverage	**Maximising benefits: offsetting and interacting policies**	Additional model runs: Phasing carbon tax and ETS free allocation

Supplementary model runs

1. Changes to NDC assumptions

2. Changes to ETS allocation, offsets and revenue recycle

3. Changes to carbon tax rate

Model refinements – Scenario summary

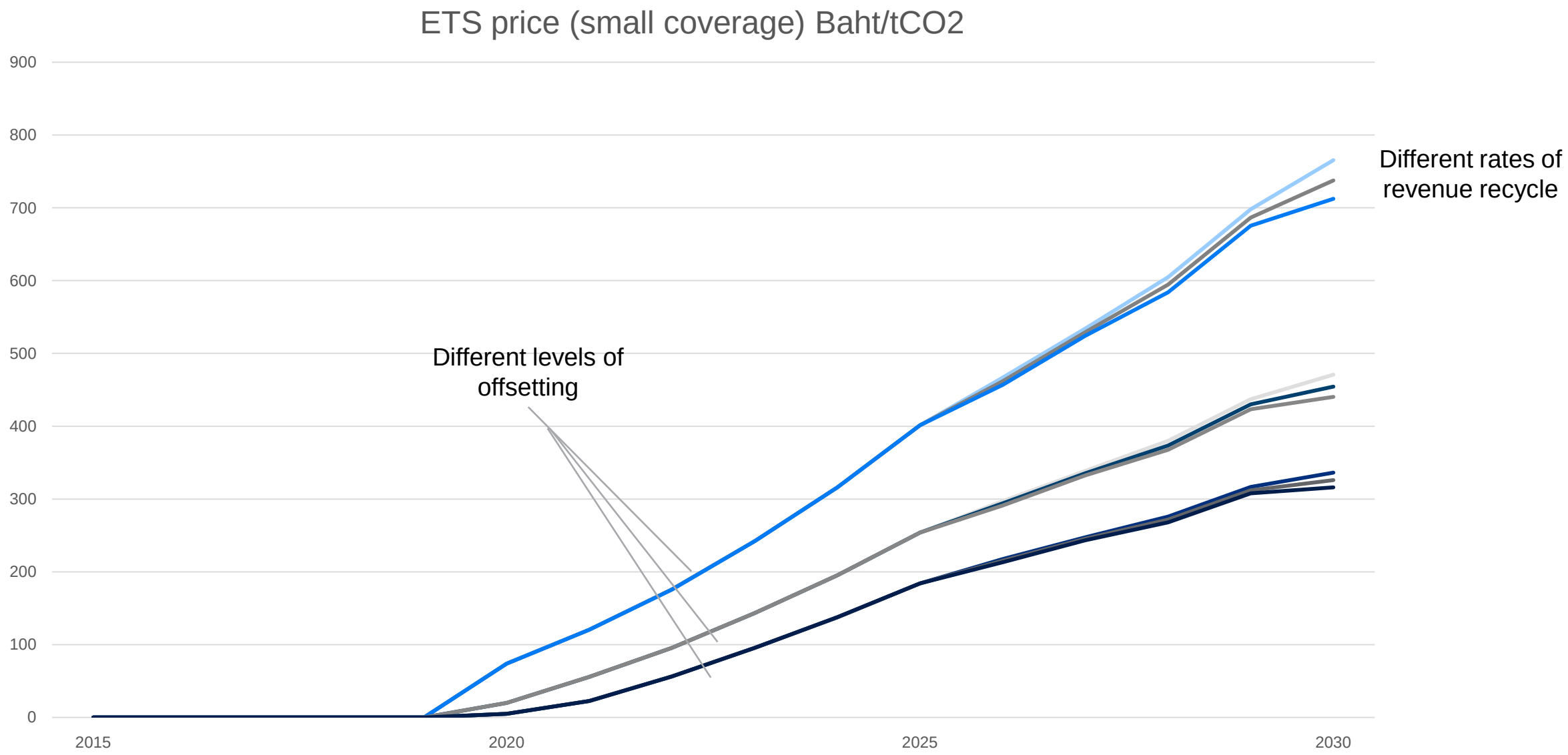
Instrument	Sector coverage	Revenue recycling	Offsetting option (For ETS)	Scenario	Carbon tax rate
ETS	Small	0%	0%	TH-ETS1	-
			10%	TH-ETS2	-
			15%	TH-ETS3	-
		25%	0%	TH-ETS4	-
			10%	TH-ETS5	-
			15%	TH-ETS6	-
		50%	0%	TH-ETS7	-
			10%	TH-ETS8	-
			15%	TH-ETS9	-
Carbon Tax	Very large	0%	-	TH-CT1	Standard
		25%	-	TH-CT2	
		50%	-	TH-CT3	
		0%	-	TH-CT4	Low
		0%	-	TH-CT5	High
Hybrid	ETS – Small Carbon Tax – remaining sectors	0%	0%	TH-HB1	Standard
			10%	TH-HB2	
			15%	TH-HB3	
		25%	0%	TH-HB4	
			10%	TH-HB5	
			15%	TH-HB6	
		50%	0%	TH-HB7	
			10%	TH-HB8	
			15%	TH-HB9	

Additional scenario elements

- **Measures to reduce cost to business:**
  - ETS auctioning:
    - 2020-2025 Free
    - 2026-2027 Auction 3%
    - 2028-2029 Auction 5%
    - 2030 Auction 10%
  - ETS offsets:
    - Only none (0%), some (10%) and max (15%) of ETS offsets are allowed
    - Offsets under ETS comes from power and road transport
    - Offsets under Hybrid comes from power sector only (since transport is included in CPI)

- **Measures to improve practical feasibility of revenue recycling**
  - Carbon tax rate:
    - Standard: 300/900/1500/1800 Baht/tCO_2 step change every three years.
    - Low: 150/450/750/900 Baht/tCO_2 step change every three years
    - High: model calculate tax rates required to meet NDC in 2030
  - Revenue recycling
    - Revenues collected are auctioned revenues and carbon tax revenues
    - Only none (0%), some (25%) and max (50%) of total revenues collected are recycled
    - All eligible revenues are used for energy efficiency investment

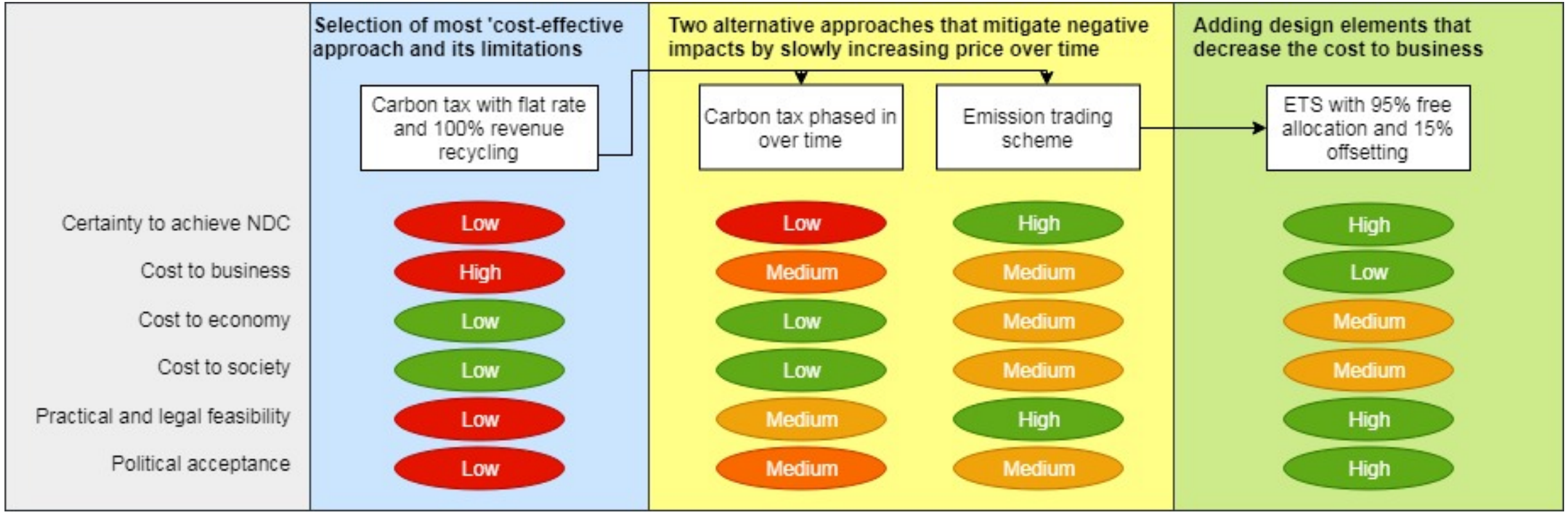
ETS model refinements



Summary table

Instrument	Scenario	Revenue recycling rate	Offsetting	Cost to business (carbon price Baht/tCO2)	Cost to economy (GDP 2015 bn Baht)
ETS	TH-ETS1	0%	0%	765	17383
	TH-ETS2	0%	10%	471	17388
	TH-ETS3	0%	15%	336	17391
	TH-ETS4	25%	0%	738	17387
	TH-ETS5	25%	10%	455	17391
	TH-ETS6	25%	15%	326	17392
	TH-ETS7	50%	0%	713	17390
	TH-ETS8	50%	10%	440	17392
	TH-ETS9	50%	15%	316	17394

ETS with industry coverage, 95% free allocation and 15% offsetting comes out as the preferred policy option



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Panel session

Questions

- Do you have any questions about the model runs and analysis presented?
- Are there other benefits to the policies presented here that have not been highlighted?
- Do you have a preferred policy option from the list presented here?
- What is your feedback on the recommendations presented here?
- What are some next steps forward for Thailand based on the information presented here?

- **Key findings and main recommendations:**
- **Of all the scenarios presented in this document, the TH-ETS9 case provides the most positive impacts in social, economic and environmental terms to Thailand:**
  - Applies an ETS whereby the carbon price is optimised over time, thereby avoiding high costs to businesses.
  - Applies only to industry sectors, as these sectors have shown to have cheaper abatement options that can easily be incentivised with an ETS.
  - Further reduces costs to businesses by applying a 15% offsetting rate and a 50% auctioning rate so that revenues can be recycled for a positive impact on GDP and emissions. This means the carbon price is the lowest of all the ETS cases considered here, thereby indicating potential higher political acceptance.
  - Lastly, the choice for an ETS means that the CPI provides certainty the NDC targets will be achieved.

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Revenue recycling, admin costs and penalty rates	Sectoral coverage	Maximising benefits: offsetting and interacting policies	**Additional model runs: Phasing carbon tax and ETS free allocation**